

## **AMMENDMENTS TO THE CLAIMS**

A listing of all claims and their current status in accordance with 37 C.F.R. § 1.121(c) is provided below.

1. (original) A polyolefin production system, comprising:  
a polymerization reactor; and  
a temperature control system configured to control the temperature of a reaction mixture within the polymerization reactor, wherein the temperature control system comprises a temperature control valve having a bilinear flow characteristic disposed in a conduit of the temperature control system.
2. (original) The polyolefin production system as recited in claim 1, wherein a transition region where the bilinear flow characteristic changes slope corresponds to a coolant condition for a polyolefin grade having the least demanding cooling requirement of the polymerization reactor product mix at or below design production turndown of the polymerization reactor.
3. (original) The polyolefin production system as recited in claim 2, wherein the polymerization reactor is a polyethylene reactor.
4. (original) The polyolefin production system as recited in claim 2, wherein the coolant condition generally corresponds to 75% of normal production rate of the polyolefin grade having the least demanding cooling requirement.

5. (original) The polyolefin production system as recited in claim 1, wherein the bilinear flow characteristic changes slope at less than 50% open position of the temperature control valve.
6. (original) The polyolefin production system as recited in claim 1, wherein the bilinear flow characteristic is derived from a simulation model.
7. (original) The polyolefin production system as recited in claim 1, wherein the temperature control system comprises one or more controllers configured to operate the temperature control valve.
8. (original) The polyolefin production system as recited in claim 7, wherein one or more tuning constants of the one or more controllers are derived from a dynamic simulation model.
9. (original) The polyolefin production system as recited in claim 1, wherein a calculation block that defines the output of a slave controller configured to operate the temperature control valve is derived from a simulation model.
10. (original) The polyolefin production system as recited in claim 9, wherein the slave controller is configured to operate more than one temperature control valve.
11. (original) The polyolefin production system as recited in claim 1, wherein the polymerization reactor comprises a loop slurry reactor configured to react at least one or more monomers and one or more catalysts to form a polymer.

12. (original) The polyolefin production system as recited in claim 1, wherein the polymerization reactor comprises at least one of a motive device, a reactant inlet, a catalyst inlet, a diluent inlet, and a polymer slurry outlet.

13. (original) The polyolefin production system as recited in claim 1, wherein the temperature control system comprises:

one or more reactor jackets configured to thermally interface with the polymerization reactor and to allow circulation of a liquid within the reactor jackets;

one or more heat exchangers configured to remove heat from the liquid;

one or more pumps configured to circulate the liquid through the one or more reactor jackets and the one or more heat exchangers; and

a plurality of conduits connecting at least the one or more reactor jackets, the one or more heat exchangers, and the one or more pumps.

14-46. (cancelled)